

**CE CIT UOB**  
**ITCE471 (DSP)**  
**Test 1**

**Time: 1 hour**

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**Q1 [20 marks]**

Digitize the following analog signals when sampled at 10 kHz:

$$\mathbf{x(t) = 2 + 3 e^{-5000t} u(t) + 4 \sin (2500 t) u(t)}$$

Find  $x[n]$  at  $n = 0$ ,  $n = 2$  and  $n = 5$

Is  $x[n]$  periodic? If yes, find period. If no, why?

**Q2 [15 marks]**

Find the energy and power of the following signal:

$$\mathbf{x[n] = 10 \sin (\pi n / 2)}$$

**Q3 [25 marks]**

- a) **Realize** the relaxed causal system  $\mathbf{y[n] = 0.5 y[n-2] + 2 x[n]}$
- b) Find  $y[n]$  at  $n = 0, 1, 2, 3, 4$  and  $\infty$  when  $\mathbf{x[n] = u[n]}$
- Discuss the stability of this system.

**Q4 [40 marks]**

Assume a DSP system with impulse response  $\mathbf{h[n] = \{ 1 \ -2 \ -1 \}}$ :

- a) Find DTFT of the system then plot **clearly** its freq. response
- b) Discuss the filter type of this system